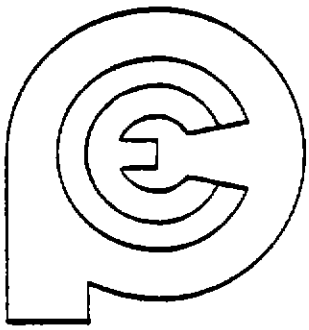
AN ANALYSIS OF THE REPORT OF THE GRADUATE MEDICAL EDUCATION NATIONAL ADVISORY COMMITTEE



CALIFORNIA POSTSECONDARY EDUCATION COMMISSION
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Commission Report 82-1

January 1982

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INTRODUCTION

Supplemental language in the 1981-82 State Budget requires that the Commission conduct a study of the Report of the Graduate Medical Education National Advisory Committee to the Secretary, Department of Health and Human Services (1980):

> The University of California, the California Postsecondary Education Commission, and the Division of Health Professions Development with[in] the Office of Statewide Health Planning shall review the findings and recommendations contained in the GMENAC report. The Commission shall convene an initial meeting among all parties and identify issues and findings within the GMENAC report for each agency to address in their report. The review by all parties shall be within the context of California's health personnel needs and UC's projected enrollments. All the reports shall be submitted to the appropriate legislative budget committees and to the Department of Finance by February 15, 1982.

In compliance with this supplemental budget language, the Commission, after consultation with its two partners on this project, has prepared the following evaluation of the GMENAC report, emphasizing those controversial portions of the report which deal with the determination of supply of and demand for physicians in 1990. Certain parts of this analysis are technical in nature; the details of this analysis appear in Appendix A.

BACKGROUND ABOUT GMENAC

The federally sponsored Graduate Medical Education National Advisory Committee was created in 1976 by David Matthews, Secretary of Health, Education, and Welfare in the Ford Administration. It consisted of some 23 members, 18 of whom were physicians (nine in academic medicine, five in practice settings, and four in government), plus two nurses and three laymen.

The original purpose of the Committee was described in two sentences of its charter:

> The purpose of this Committee is to analyze the distribution among specialties of physicians and medical students and to evaluate alternative approaches to ensure an appropriate balance. The Committee will also encourage bodies controlling the number, types, and geographic location of graduate training positions to provide leadership in achieving the recommended balance (Volume VII, p. 55).

This statement of purpose, which seems to assume the existence of prior agreement as to what is an "appropriate" and therefore "recommended" balance of specialty distribution, was reaffirmed without modification by two subsequent Secretaries of Health, Education, and Welfare in re-chartering the Committee--Joseph Califano in 1978 and Patricia Harris in 1980. In addition to this statement of purpose, the Committee charter contains a more extensive list of functions. This expanded language establishes the Committee's responsibility for recommending to the Secretary strategies concerning supply and distribution of physicians, the number of physicians needed to meet the health care needs of the nation, and appropriate ways to finance graduate medical education. Apparently GMENAC pursued these specific functions without always ensuring that its broad purposes were being achieved; this is evident from its disregard of its charge to "evaluate alternative approaches" to ensuring appropriate balance among medical specialties. Perhaps greater attention to its full charge might have kept GMENAC from encountering some of its difficulties discussed later in this review.

THE GMENAC REPORT

Members of GMENAC were assigned to one or more of five technical panels which developed recommendations in assigned areas for review by the entire GMENAC membership. Among the seven volumes of almost nine hundred pages, Volume I is the Committee's summary report, explaining the scope, activity, and findings of the project. Volume II, the work of the Modeling, Research, and Data Technical Panel, contains the methodology and computations which give rise to the findings of a surplus of physicians. Volume III is the report of the Geographic Distribution Technical Panel; Volume IV is devoted to findings of the Financing Technical Panel; Volume V describes the work of the Educational Environment Technical Panel; and Volume VI contains the findings of the Nonphysician Health Care Provider Technical Panel. The final volume, GMENAC Members' Commentaries and Appendix, provides comments--including dissent--of several committee members, as well as a list of all panel recommendations.

Despite the name of the committee, its report devotes relatively little attention and only seven of sixty-five recommendations to graduate medical education. None of these recommendations (Nos. 2g, 4, 13, 20, 21, 24, and 32 on pp. 15 - 22 below) is new or controversial. Instead, both the report and the responses it has generated deal almost exclusively with physican manpower. Virtually all of these recommendations have appeared and been discussed in other contexts in the literature of health manpower and education, and many have already been implemented into State policy in California.

The most controversial recommendations in the report were produced by the Modeling, Research, and Data Technical Panel. This panel, after finding that there will be a significant "surplus" of 70,000 physicians in most specialties by 1990, recommended, among other things, that medical schools by 1984 reduce the size of entering classes by 17 percent compared to the size of 1980-81 entering classes (Recommendation 1, page 13 below). This recommendation has greatly disturbed the medical education community and has intrigued analysts in State government. Thus the assignment by the Legislature of a review of GMENAC recommendations by the California Postsecondary Education Commission, the University of California, and the Office of Statewide Health Planning and Development is timely and practical, providing as it does an opportunity to determine what California's response to this and other GMENAC suggestions should be.

QUESTIONS ABOUT THE GMENAC REPORT

In analyzing the GMENAC report, the Commission has explored a series of questions involving GMENAC's determination of the need for physicians in 1990, to which GMENAC devotes the bulk of Volume II. The remainder of that volume deals with the supply model, with which the Commission has no serious problem. Among the questions the Commission has asked are these:

1. How valid are the (a) explicit and implicit assumptions (b) methodology and data, and (c) findings of GMENAC's modeling panel regarding supply and demand for physicians?

2. If these findings are valid, are the recommended courses of action the best ways to deal with the problems which have been identified?

3. If the findings are valid, are there circumstances which call for a different course of action in California than in other states?

4. If the findings are valid, what would be the effects of a "surplus" of physicians?

The several parts of the first question provide the key to the Commission's evaluation of the report. If GMENAC's modeling panel improperly conceived or carried out its study, the other questions about alternative courses of action may be of limited usefulness. Nevertheless, these questions deserve to be asked in order to focus attention on issues which are external to the GMENAC study but relevant to its outcomes.

How Valid Are GMENAC's Assumptions About Physician Supply and Demand?

GMENAC's report does not specifically identify the assumptions that underlie its work. However, a number of implied assumptions in the document may be challenged:

Assumption 1: A "surplus" of physicians is an undesirable situation.

This is apparently the fundamental premise of the GMENAC study, giving rise to the various concerns about overproduction of physicians. Yet, only a few words in one sentence in the first few pages of the document try to provide a rationale for these concerns, the rationale being the absence of cost effectiveness in the training and utilization of "surplus" physicians. (This basic assumption will be discussed in more detail later in this review.)

Assumption 2: In the future, the work load and procedures of physicians will be about the same as they are today.

Although it claims to have accommodated changing patterns of practice through the input of its modeling panel regarding future work schedules and productivity of physicians, GMENAC projects patterns of practice very similar to those used today under the "taut supply" situation described by medical economists: In general, it accepts the pattern of a physician who can see four or five patients per hour over a fifty-hour week for forty-eight weeks a year. Likewise it expects physicians to treat only illness and to spend relatively little of their time in prevention of disease and maintenance of health.

Assumption 3: An innovative, comprehensive, and logical computer model of physician manpower can provide an accurate projection of the number and type of physician required in the future, even if the quantitative data used in the model are largely subjective and often in dispute.

Although the GMENAC report contains caveats with respect to data, such as, "the crucial need for this model is accurate data on incidence/prevalence of most medical conditions and procedures, on the norms of care, and on the productivity of health service personnel" (Volume I, p. 50), it is clear that the report offers strong findings and unequivocal recommendations where one might expect tentative findings and guarded recommendations based on data about which disagreement is frequent.

How Valid Are Its Methodology and Data?

The ambitiousness of the methodology of the GMENAC study, particularly the supply and demand model for physician manpower, is perhaps its greatest strength. Unfortunately, the information fed into this model is clearly its greatest weakness.

To establish the requirement for physicians in 1990, GMENAC made use of a complex computer model involving basically the incidence of disease as one major variable, the norms of care as the second, and the productivity of physicians as the third. For data on those variables, GMENAC convened panels of experts, generally physicians, in 17 different medical specialties. With the help of staff and whatever information was available in the literature, these "Delphi" panels estimated the following series of 12 numerical factors--the first three relating to the major variable of incidence of disease, and the remaining nine relating to the norms of care and physician productivity, with the distinction between the latter two not always clear:

1. The incidence and prevalence of morbidity/conditions, as identified in the International Classification of Diseases, Adapted (ICDA).

2. The proportion of those people with a given illness who need physician care.

3. The proportion of those people needing physician care who need specialist care.

4. Office visits required in a year per episode of illness.

5. Hospital visits required in a year per episode of illness.

6. Surgical procedures required in a year per episode of illness.

7. Average time spent in providing each type of service.

8. Average number of different conditions treated per visit ("simultaneity of care").

9. Number of units of a given type of service that could be provided in a year by the typical specialist.

10. Number of hours worked in an average year by the typical specialist.

11. Distribution of working time by type of service provided for those specialists.

12 Work that could be delegated to nonphysician providers.

After each panel of experts had developed its best estimate for these data elements, the data were put into a series of formulae to obtain the total number of specialists required in 1990. A sample of these manpower formulae appear in Appendix B, which reproduces the section on Orthopedic Surgery from Volume II of the GMENAC report.

The final manpower formula for the number of physicians needed in each specialty makes use of a series of elements of morbidity incidence and physician productivity which had been determined in several preliminary formulae. This final formula can be depicted as:

$$N = \frac{\frac{S_1 + S_{2B} + S_{3C}}{P_1} + \frac{S_{2A} + S_{3B}}{P_2} + \frac{S_{3A}}{P_3}}{1-F_3}$$

In essence, this formula provides that the number of physicians needed in each specialty (N) is determined by dividing the annual office visits required for all nonhospitalized, nonsurgical hospitalized, and surgical hospitalized patients ($S_1 + S_{2B} + S_{3C}$) by the annual productivity of a full-time-equivalent physician, expressed in the total number of possible office visits annually if doing only this (P_1), to which is added the product of a similar division of the annual hospital inpatient contacts for hospitalized surgical and nonsurgical patients ($S_{2A} + S_{3B}$) by the productivity of a full-time-equivalent physician, expressed in the total number of possible inpatient visits if doing only this (P_2), to which is then added another such product of the division of the annual hours of required surgery (S_{3A}) by the productivity of a full-time-equivalent physician expressed in the total number of hours worked annually in all activities (P_3) This total is then divided by the percentage of a physician's time spent in patient care activities ($1-F_3$).

Each of the elements in this formula is defined as follows:

N = the number of physicians needed in each specialty

S_1 = the number of physician office contacts needed annually for nonsurgical, nonhospitalized patients

S_{2B} = the number of physician office contacts needed annually for nonsurgical, hospitalized patients

S_{3C} = the number of physician office contacts needed annually for surgical, hospitalized patients

S_{2A} = the number of physician hospital visits needed annually for nonsurgical, hospitalized patients

S_{3B} = the number of physician hospital visits needed annually for surgical, hopitalized patients

S_{3A} = the number of hours of surgery needed annually

P_1 = the productivity of a full-time-equivalent physician, in total number of office visits annually, doing only this

P_2 = the productivity of a full-time-equivalent physician, in total number of hospital visits annually, doing only this

P_3 = the productivity of a full-time-equivalent physician, in annual hours worked in all activities

F_3 = the proportion of physician time spent in non-patient-care activities

The numerical data (or, more accurately, the estimates), together with formulae and computations used in determining need by each of these panels of experts were then reviewed by a second "modeling" panel made up of GMENAC members. This modeling panel presumably had a view of the requirements in all specialties that was broader than the parochial view of the specialty panels, and was aware of the potential overlap between fields as well as the impact of new technology, new trends, and changing demography on health care. This panel could, and often did, change the data elements in a formula, as can be seen by comparing its estimate of 1990 needs in Appendix C with those of the Delphi or "expert" panels. A few dramatic examples serve to illustrate how critical this review and alteration process was to the findings of the GMENAC report

Adult Primary Care: In determining the number of visits to family physicians, general practitioners, and general internists required

annually by 1990 for arthritis (ICDA #715), the expert panel estimated about 102 million such visits. The modeling panel, however, reduced this requirement drastically to about 773 thousand visits. Differences of such magnitude not only throw the entire data development process into question; their effect on the manpower requirement is staggering. Using the expert panel's estimate, some 18,478 physicians would be needed to treat arthritis alone, using the modeling panel's version--and GMENAC seems to have always adopted the modeling panel version--only 149 physicians will be needed. The difference between the two figures is 18,138. Inasmuch as the final GMENAC projection within the text of the Report (rather than in Appendix B below) shows a supply of 153,300 and a "surplus" of 7,700 physicians in these primary care fields, it is clear that if the expert panel's views on only one type of morbidity were allowed to stand, a shortage of more than 10,000 physicians would exist in these fields, rather than a surplus of 7,800. Significantly, arthritis was only one of more than 250 ICDA morbidity conditions factored into the formulae for adult health care; all of the others represent potential data problems as well. Thus in adult care alone, the modeling panel reduced the expert panel's estimate for obesity by 69 percent; for hypertension by 55 percent; well care by 64 percent; diabetes, 33 percent; asthma, 42 percent; migraine, 85 percent; functional intestinal disorders, 67 percent; and ischemic heart disease, 63 percent. The total reduction made by the modeling panel for all conditions seen by adult primary care physicians was 37 percent, which translates into more than 622 million office visits. Using the most conservative formula for physician productivity, more than 77,500 additional physicians will be required to provide care to adults if the expert panel is correct, while we will have 6,650 too many physicians if the modeling panel is correct.

Orthopedic Surgery and Obstetrics/Gynecology: Two examples, albeit not as spectacular, may suffice to illustrate differences in the determination of physician productivity. In orthopedic surgery, the modeling panel increased by 1.5 the number of patients seen per hour in office visits--from 3.5 as determined by the expert panel to 5 0. This increase alone would eliminate the need for 2,449 physicians. Inasmuch as 5,000 orthopedic surgeons represents a "surplus" in this field as projected by GMENAC, almost half of this oversupply would disappear on the basis of this one factor alone if the expert panel is correct rather than the modeling panel Similarly, the modeling panel reduced the average number of hours needed to deliver a baby by 1 5--from 4.5 hours as determined by the expert obstetrics/gynecology panel to 3 hours. This reduction, together with other work load changes, have the effect of eliminating the need for 23 percent of the full-time-equivalent obstetrics and gynecological specialists projected by the expert panel as required for deliveries.

Based on a number of such instances of disagreement between GMENAC's expert and modeling panels, GMENAC's "data" of manpower requirements seem so subjectively determined and so controvertible, and its computer model so sensitive to the effects of changes in any of hundreds of variables which serve as multipliers in the formulae, that its resultant quantitative findings are open to serious question.

How Valid Are Its Findings?

GMENAC seems more justified in predicting a supply of 535,750 physicians in 1990 than it does in projecting a need for 466,000 of them at that time. It also seems to have derived the distribution of these physicians by specialty more reasonably in its supply model than in its requirements model. Thus it assumes that first-year medical school enrollment will level off at about 18,000 in 1982-83, that first-year osteopathic school enrollment will level off at about 1,900 in 1987-88, and that the annual influx of foreign medical graduates into residencies will stabilize at about 4,100 by 1983. While some variation from these assumptions and from the empirical data on career paths as used in the supply model may occur, GMENAC's overall supply projection will probably not be greatly affected.

GMENAC's findings from its need model, however, are not as acceptable As discussed in the previous section on methodology and data, the uncertainties in data in this model throw into question the findings and recommendations derived from the model The number of physicians required in 1990 may indeed be the number determined by the modeling panel and GMENAC, but if so, this congruity would be more coincidental than it would be reflective of the complex computer model with the unreliable data.

ALTERNATE COURSES OF ACTION TO REDUCING ENROLLMENT

Regardless of whether the findings of the GMENAC report are valid--and in the case of the need model, they are not--it is useful to ask if the course of action GMENAC proposes in its first recommendation in reducing medical school enrollment is the best alternative available. (It should be noted again that in its report GMENAC ignores its original charge regarding evaluation of "alternative approaches" to assure an appropriate balance among specialties of physicians and medical students.) Such a reduction is certainly not the only possible way to move toward a balance between the supply of and need for physicians in 1990, if indeed that need were to be somewhat smaller than supply. A major alternative would be to stimulate demand for physician services in response to latent unmet need. The kind of comprehensive and continuous monitoring

and maintenance of family health which is envisaged as ideal primary care by the Health Manpower Plans produced by the California Office of State Health Planning and Development would require far more physicians than that required with the episodic care characteristic of the "taut supply" of physicians in the present health care marketplace. New forms of health care delivery, new attention to preventive care, and a new desire by physicians to reduce the work load and pressures of their practice all might combine to produce a situation in which physician productivity declines while demand increases. Whether all of this is socially desirable, or even realistic, under the present system of incentives is beside the point; the fact remains that there are two sides to a supply-demand or supply-need equation, and it is entirely possible to alter the second half of the equation as well as the first.

ALTERNATIVE COURSES OF ACTION FOR CALIFORNIA

Even assuming the validity of GMENAC's findings, it is necessary to ask whether California's circumstances are such that GMENAC's recommended course of action are as applicable here as in the nation as a whole. Several circumstances suggest that enrollment cutbacks are not justified here.

First, the applicability of the findings of the study to California may readily be questioned. The basic parameters of the study, particularly those concerned with the incidence of disease, are national in scope; these factors vary enormously from state to state, depending upon climate, socio-economic conditions, size and variety of ethnic and counter-culture groups, and other variables. Without replicating the GMENAC study in California with California data there is no way of knowing if its findings--and thus recommended courses of action--have any validity here.

Second, if there indeed is a problem of overproduction of physicians nationally, California is in no way contributing to it. In the United States in 1978--at the start of the GMENAC projections--375,000 physicians were in active practice. To meet the replacement needs for this group--approximately 2.22 percent annually, assuming a 45-year career--an additional 8,325 new physicians would be needed each year. At the time all medical schools in the United States were producing a total of 14,393 graduates, or 173 percent of our national replacement needs. But in California with 45,500 nonfederal physicians we need to graduate 1,010 physicians from our 8 medical schools annually to meet our replacement needs, but we are graduating only about 940 new physicians a year, or 93 percent of our replacement needs. Thus, even if the nation is overproducing physicians in terms of replacement needs, in California this is not the case

Third, related to our underproduction of physicians in California is limited opportunity for Californians to attend medical school. As noted in the Commission's Health Sciences Education Plan (1979, pp. 19-32), California ranks very low among the states in the success its citizens have in getting into medical school. Furthermore, in a climate of limited access, expansion of affirmative action efforts is not as likely to occur as in a climate of more abundant opportunities.

Thus at least three reasons exist for California not to implement GMENAC's recommended cuts in medical school enrollment. Not only are GMENAC's data that gave rise to this recommendation not particularly applicable in California, but this State has not contributed to any "excess" of physicians which may or may not exist, and such cuts would both unduly penalize Californians who already have limited access to medical schools compared to the citizens of other states and jeopardize opportunities to expand affirmative action efforts.

EFFECTS OF SURPLUS

Much of the concern over a surplus of physicians grows out of the writings of certain health economists who have argued, convincingly at times, that physicians tend to create demand for their own services. According to this theory, a physician can move into a community seemingly saturated with physician manpower and can not only survive economically but actually thrive because of the willingness of physicians to refer patients to one another and to require additional tests and specialized secondary/tertiary care. Furthermore, physicians can raise their prices and incomes in this setting because of the "demand" that they have created themselves

It is certainly possible to find a number of examples of this phenomenon. However, those who view this practice as leading ultimately to enormous social costs for health care that are "out-of-control" seem to ignore the possibility of any checks and balances to this "excessive" health care. Two possible agents for checks and balances seem to exist: third party payors, and government. The reimbursement policies of insurance companies and Medicaid-Medicare agencies can certainly have a damping effect on excessive procedures. So can the specter of governmental agencies waiting in the wings, anxious to intervene further in the regulation of the medical profession.

But the ultimate determinant may yet be the marketplace. In the last two years signs of competition have been increasing among physicians. This can be illustrated by the growth of local Health Maintenance Organizations (HMOs), some of which are admittedly

attempts to keep large organizations such as Kaiser from increasing its share of a community's health care; it is also evidenced by the recent Wall Street Journal article on how physicians are becoming conscious of marketing techniques (1981). Clearly, the Reagan Administration believes that with competition will come a better chance to control costs of health care.

As the Commission noted in its most recent health science education plan, State agencies really do not know what having considerably more physicians would mean in California, but they ought to be trying to find out.

CONCLUSIONS

The following list of GMENAC recommendations and Commission responses to these recommendations summarizes the contents and emphasis of GMENAC's findings. Particular attention should be paid to the first of these recommendations, which stems from the computer modeling done by GMENAC in determining supply and requirements levels for physicians in 1990. In spite of the magnitude of the effort that went into this modeling and the significance of the study's contribution to the field of health manpower forecasting, it would be unwise for California to make use for policy purposes of GMENAC's findings and recommendations in connection with physician requirements or enrollments in medical education. There is too much inconsistency in the data, in the use of the computer model, and in the functioning of the various panels to allow confidence in the outcomes of the GMENAC study in these areas. In addition, the key recommendations developed by GMENAC in these areas go well beyond a level of assertiveness and conclusiveness which would be justified by such imprecise and controvertible data

GMENAC has made a good case for the existence of a future supply of physicians that is significantly larger than that which we have today. Such a finding cannot be dismissed simply because its physician requirements model is unreliable due to the absence of good data. The challenge remaining for California is to determine what good will come, or can be made to come, from this large supply of physicians at an acceptable social cost. The State might usher in a Golden Era of health care with these additional physicians, but the price of gold is notoriously hard to predict. Clearly, the need is for public policy groups such as the Health Policy Center at the University of California, San Francisco, to examine the social and economic consequences of this larger physician population in California.

GMENAC RECOMMENDATIONS AND COMMISSION RESPONSES

GMENAC RECOMMENDATIONS	COMMISSION RESPONSES
1. Allopathic and osteopathic medical schools should reduce entering class size in the aggregate by a minimum of 10 percent by 1984 relative to the 1978-79 enrollment or 17 percent relative to the 1980-81 entering class.	*Disagree. Sweeping recommendations such as this should not be derived from such grossly unreliable data.*
Supportive recommendations:	
a. No new allopathic or osteopathic medical schools should be established beyond those with first-year students in place in 1980-81.	*Agree in principle, but special circumstances could exist such as a medical school training missionaries for other countries.*
b. No increase in the entering class size into allopathic and osteopathic medical schools beyond the entering class of 1981 should occur.	*Agree in principle, but special circumstances could exist.*
c. The current Health Professions Law, which authorizes grants to health professions schools for construction of teaching facilities, should be amended to allow the Secretary of the Department of Health and Human Services to grant waivers to allow them to ignore the law's requirement to increase enrollment. This recommendation applies as well to the pertinent Veterans Administration authorities under the Manpower Grants' Program.	*Agree.*
d. The current Health Professions Law should be amended to allow the Secretary of the Department of Health and Human Services to waive immediately the requirement that allopathic and osteopathic medical schools, as a condition of receiving a capitation grant, maintain the first-year enrollment at the level of the preceding school year. This recommendation applies as well to the pertinent Veterans Administration authorities under the Manpower Grants' Program.	*Agree.*
2. The number of graduates of foreign medical schools entering the U.S. yearly, estimated	*The Commission agrees in principle that the number of foreign*

to be 4,100 by 1983, should be severely restricted. If this cannot be accomplished, the undesirable alternative is to decrease further the number of entrants to U.S. medical schools.

medical school graduates entering the United States each year should not be allowed to increase beyond the anticipated 1983 levels (which is what GMENAC seems to mean by "severely limited"), although GMENAC does not indicate how this goal should be achieved. The alternative proposal in the second part of the recommendation (to decrease medical school enrollments) is not acceptable.

Supportive recommendations:

a. All federal and state assistance given through loans and scholarships to U.S. medical students initiating study abroad after the 1980-81 academic year should be terminated.

Agree in principle. It is conceivable, however, that an advanced student could be studying abroad for a purpose that was socially desirable, such as studying tropical medicine.

b. The current efforts in the private sector to develop and implement a uniform qualifying examination for U.S. citizens and aliens graduating from medical schools other than those approved by the L.C.M.E. (Liaison Committee for Medical Education) as a condition for entry into L.C.G.M.E. (Liaison Committee for Graduate Medical Examination) approved graduate training programs should be supported. Such an examination must assure a standard of quality equivalent to the standard applied to graduates of Liaison Committee on Medical Education accredited medical schools. These U.S. citizens and aliens must be required to complete successfully Parts I and II of the National Board of Medical Examiners' examination or a comparable examination. The Educational Commission for Foreign Medical Graduates (E.C.F.M.G.) examination should not be used as the basis for measurement of the competence of (American graduates of foreign medical schools) or alien physicians.

Agree in principle, but the Commission is not prepared to comment on the value of the Educational Commission for Foreign Medical Graduates (ECFMG) examination.

c. Alien physicians, who enter the United States as spouses of U.S. citizens, should be required to complete successfully Parts I and II of the National Board of Medical

Agree.

	Examiners' examination or a comparable examination prior to entry into residency training.	
d.	The ability to read, write, and speak English should remain a requirement for graduate medical education programs for all alien physicians.	*Agree.*
e.	The Federation of State Medical Boards should recommend and the states should require that all applicants successfully complete at least one year of a G.M.E. (graduate medical-education) program that has been approved by the L.C.G.M.E. and successfully pass an examination prior to obtaining unrestricted licensure. The examination should assure a standard of quality in the ability to take medical histories, to do physical examinations, to carry out procedures, and to develop diagnostic and treatment plans for patients. The standard of quality should be equivalent to graduates of United States medical schools.	*Agree. We recommend that the licensing board should require a broad-based clinical experience with emphasis on the generalist clinical fields during the early phase of graduate medical education.*
f.	The states should severely restrict the number of individuals with limited licenses engaged in the practice of medicine. This restriction applies to those practicing independently without a full license and to those practicing within an institution without adequate supervision.	*Agree in principle. However, it is conceivable that limited licenses may have some value in physician licensing.*
g.	The "fifth pathway" for entrance to approved programs of graduate medical education should be eliminated.	*Agree in principle, although Fifth Pathway with commitment of service in underserved areas might be useful.*
h.	The transfer of U.S. citizens enrolled in foreign schools into advanced standing in U.S. medical schools should be eliminated.	*Disagree. This is an admissions matter for individual medical schools.*
3.	The need to train nonphysician health care providers at current levels should be studied in the perspective of the projected oversupply of physicians.	*Agree in principle, but the need should be studied without a qualifying context.*
4.	To correct shortages or surpluses in a manner not disruptive to the G.M.E. system, no specialty or subspecialty should be expected to increase or decrease the number of first-year trainees in residency or fellowship training programs more than 20 percent by 1986 compared to the 1979 figure.	*Agree in principle that disruptions should be minimized, but a small or new specialty might need faster change than that permitted under a percentage limit.*

5. In view of the aggregate surplus of physicians projected for 1990, medical school graduates in the 1980's should be strongly encouraged to enter those specialties where a shortage of physicians is expected or to enter training and practice in general pediatrics, general internal medicine, and family practice.

Agree in principle, but students should not be made to feel that they are choosing a less desirable career if they choose research or an exotic specialty.

6. Extensive research on the requirements for N.P.'s (nurse practitioners), P.A.'s (physician's assistants), nurse-midwives, and other nonphysician providers should be undertaken as soon as possible. Special attention must be given to the effect of a physician excess on their utilization and to the benefits these providers bring to health care delivery. These studies should consider the full range of complementary and substitute services.

Agree.

7. Until the studies in Recommendation 6 have been completed, the number of P.A.'s, N.P.'s, and N.M.W.'s (nurse-midwives) in training for child medical care, adult medical care, and obstetrical/gynecological care should remain stable at their present numbers. Delegation levels recommended by G.M.E.M.A.C. for 1990 are: in obstetrics/gynecology 197,000 of the normal uncomplicated deliveries (6 percent of all deliveries), 7.1 million maternity-related visits (20 percent of the obstetrical caseload), and 7.5 million gynecological visits (19 percent of the gynecological caseload); in child care not more than 46 million ambulatory visits (16 percent of the child ambulatory caseload; and in adult medical care not more than 128 million ambulatory visits (12 percent of the adult medical ambulatory caseload).

Disagree. The study recommended in Recommendation 6 could take years. In the meantime the State might want additional nurse midwives or nurse practitioners.

8. All incentives for increasing the class size or the number of optometric or podiatric schools should cease until the studies in Recommendation 6 have been completed and evaluated.

Agree that we probably need no incentive programs in these fields, but this determination could be made independent of the study in Recommendation 6.

9. State laws and regulations should not impose requirements for physician supervision of N.P.'s and P.A.'s, beyond those needed to assure quality of care.

Agree.

Supportive recommendations:

	a. State laws and regulations should be altered as necessary so that a P.A. or N.P. working under appropriate physician supervision can independently complete a patient encounter for conditions which are deemed delegable.	*Agree.*
	b. The states should provide P.A.'s, N.P.'s, and nurse-midwives with limited power of prescription, taking necessary precaution to safeguard the quality of care including explicit protocols, formularies, and mechanisms for physician monitoring and supervision.	*Agree in principle, depending on the level of P.A. or N.P. training. The Commission would be concerned about persons with one or two years of training functioning at advanced levels.*
	c. At a minimum, P.A.'s, N.P.'s, and nurse-midwives should be given power to dispense drugs in those settings where not to do so would have an adverse effect on the patient's condition.	*Same response as for Recommendation 9b.*
	d. States, particularly those with underserved rural areas, should evaluate whether the laws and regulations pertaining to nonphysician practice discourage nonphysician location in these areas.	*Agree.*
10.	The requirements of third party payors for physician supervision should be consistent with the laws and regulations governing nonphysician practice in the state.	*Agree.*
11.	Medicare, Medicaid, and other insurance programs should recognize and provide reimbursement for the services by N.P.'s, P.A.'s, and nurse-midwives in those states where they are legally entitled to provide these services. Services of these providers should be identified as such to third party payors and reimbursement should be made to the employing institution or physician.	*Agree in principle, if the level of reimbursement is lower than for physicians in order to show any cost benefits in using mid-level practitioners.*
12.	N.P.'s, P.A.'s, and nurse-midwives should be eligible for all federal incentive programs directed to improving the geographic accessibility of services, including the National Health Service Corps Scholarship Program.	*Agree in principle, but this mechanism may not apply well to P.A.'s who depend on physician location and cannot move about very freely.*
13.	Graduate medical education should be constructed to give residents experience in working with P.A.'s, N.P.'s, and nurse-mid-	*Agree in principle, although in some specialties this would be inappropriate.*

wives to insure that these physicians will be prepared to utilize nonphysician services.

14. G.M.E.N.A.C. recommends that the basic unit for medical manpower planning should be a small geographic area within which most of the population receives a specified medical service. These functional medical service areas, service by service, are recommended as the geographic units for assessing the adequacy of manpower supply. *Agree.*

15. G.M.E.N.A.C. encourages the support of efforts within the profession to assess the outcomes of common medical and surgical practices exhibiting high variation across communities. Accomplishing this step would help to establish long-range requirements for physician services in the United States. *Agree.*

16. Variations between communities in the utilization of specific medical services should be continuously documented and analyzed. The effect of differing financing and organizational arrangements for the delivery of medical care services should be evaluated. *Agree.*

    Supportive recommendations:

    a. Utilization rate experiences, relative to the norms of other physicians practicing in the immediate area, the region, or the nation, should be made available to physicians. *Agree.*

    b. Future health manpower planning groups should compare manpower estimates, whether derived from "need" based, "demand" based, or "requirements" based models, against empirical estimates selected from areas in the United States exhibiting high and low utilization patterns. *Agree.*

17. G.M.E.N.A.C. recommends that health manpower shortage area be defined by a minimum service specific physician to population ratio and a maximum travel time to service for child care, adult medical care, obstetrical services, general surgical services, and emergency medical services. *Agree.*

Supportive recommendations:

a. The minimum acceptable physician to population ratio for any area in the U.S. should be 50 percent of the requirements estimated by G.M.E.N.A.C. for each type of health service in the nation as a whole.

The Commission is not qualified to comment on such ratios. However, it seems inconsistent for GMENAC to establish "necessary" levels of care and then to conclude that half of that level is the "minimum acceptable" level.

b. Maximum travel times to service for 95 percent of the population within a geographic area should be 30 minutes for child care, adult medical care, and emergency medical service; 45 minutes for obstetrical care; and 90 minutes for general surgical services.

Agree in principle, if travel time is defined intelligently. The Commission believes that this is an important concept which if applied to urban areas by the Health Manpower Policy Commission would significantly reduce the number of urban areas designated as medically underserved.

18. Alternative data systems for monitoring the geographic distribution of physicians should be developed and evaluated.

Agree.

19. Medical students should be encouraged to select a location for practice in underserved rural and urban areas by several approaches: (1) urban and rural preceptorships should be continued and expanded by those schools having an interest, (2) governmental loan and scholarship programs should be catalogued and evaluated to determine their effectiveness in improving geographic distribution, (3) loan forgiveness programs modeled after those which have been successful should be used, and (4) the National Health Service Corps and its scholarship program should be supported.

Agree in principle if it is understood that other, more innovative approaches are encouraged as well.

20. The medical profession in making decisions as to residency training programs should consider the aggregate number of programs, their size, and the geographic distribution of their graduates, in addition to the quality of the program, in light of national and regional needs.

Agree in principle if it is clear that other factors are considered, including the amount and cost of health care which residents can provide.

21. Family practice residency training programs should be supported since these programs tend

Agree in principle if it is understood that such support

	to train providers who are more likely to choose to practice in underserved areas. A similar rationale underlies support needed for resident experiences in underserved areas and for certain nonphysician provider training programs.	*is not to the detriment of other programs.*
22.	Area-wide programs of decentralized medical education and service such as W.A.M.I. (Washington, Alaska, Montana, and Idaho), W.I.C.H.E. (Western Interstate Commission for Higher Education), and some A.H.E.C.'s (Area Health Education Centers) should be evaluated for replicability. Such programs have been effective in placement of physicians in sparsely populated areas.	*Agree.*
23.	More research and evaluation should be conducted on factors relating to the geographic distribution of physicians.	*Agree.*
24.	Medical education in the medical schools and in the early phase of graduate medical education in the teaching hospitals should provide a broad-based clinical experience with emphasis on the generalist clinical fields. A portion of graduate medical training should occur in other than tertiary care medical centers.	*Agree.*
25.	A more vigorous and imaginative emphasis should be placed on ambulatory care training experiences.	*Agree.*
	Supportive recommendations:	
a.	The out-patient services of the academic medical centers should be upgraded through special project grants.	*Agree in principle, but grants may not be necessary.*
b.	Educational innovation in out-patient settings should be fostered by providing financial support.	*Agree in principle, but grants may not be necessary.*
c.	Faculty should be encouraged and supported to develop careers focused on ambulatory medicine through a career development award mechanism.	*Agree in principle, but grants may not be necessary.*

26.	Greater diversity among the medical students should be accomplished by promoting more flexibility in the requirements for admission; by broadening the characteristics of the applicant pool with respect to socio-economic status, age, sex, and race; by providing loans and scholarships to help achieve the goals; and by emphasizing, as role models, women and underrepresented minority faculty members.	*Agree.*
27.	Information about physician manpower needs in the various specialties and in different geographic settings should be disseminated broadly to medical schools; administrators; faculty; and medical students, residents, fellows, and spouses.	*Agree.*
28.	Capitation payments to medical schools for the sole purpose of increasing class size or for influencing specialty choice should be discontinued in view of the impending surplus of physicians.	*Agree.*
29.	Special purpose grants to medical schools and other teaching institutions for primary care training in family medicine, general internal medicine, and general pediatrics should be continued in order to continue and to increase the emphasis on primary care services and ambulatory care.	*Agree in principle, except that in California we have identified no special need for pediatrics and general internal medicine to have grant support.*
	Supportive recommendations:	
	a. Family practice programs, at least for the near term, should be given special attention in view of the difficulty in financing training programs from ambulatory care revenues.	*Agree in principle, depending on the nature of "special attention." Song-Brown support is useful, but what else is being called for?*
	b. Specialties in short supply should be considered for special project grants.	*Agree in principle, but again why grants? Wouldn't special incentives or efforts provide more flexibility?*
30.	Ambulatory care training should be promoted further by the provision of grants for renovation and construction of facilities, for the support of training programs in ambulatory sites, and for student preceptorships and residency experiences in out-of-hospital care.	*Agree in principle, but why are grants so essential?*

31.	The medical profession, having the major responsibility for correcting physician oversupply, should insure the quality of all graduate medical education programs and full funding of these programs through reimbursement should be given only to accredited programs when mechanisms are in place.	*Disagree. Aside from being ambiguous, this recommendation opposes funding for unaccredited residencies. In developing new programs in outlying areas, funding for new unaccredited residencies might be desirable.*
32.	Calculations of the true costs of graduate medical education should include the compensation for residents and teaching personnel and all of the ancillary and indirect costs, should distinguish between the cost of education and the cost of patient care by a uniform recognized reporting system. Costs should be borne equitably by all payors as part of the normal rate structure for patient care costs at the teaching hospitals, clinics, and other sites where health services and training are provided to the extent that such costs are not financed by tuition, grants, or other sources of revenue.	*Agree in principle that costs should be identified as separately as possible, but the graduate medical education functions may be inseparable. It is also difficult to define what is equitable or to decide who makes the determination of equity.*
33.	The health professions should assume a major responsibility for cost containment in new program development, in accreditation and certification, and in the provision of health services.	*Agree.*
34.	Public and private reimbursement policies should be adjusted to: emphasize ambulatory care services and training; encourage practice in underserved areas; explore the concept of shared risk among physicians; and pay professional fees to teaching physicians where their services have been identifiably discrete and necessary.	*Agree in principle unless the reimbursement policy which influences geographic distribution pays more for service in underserved areas, a practice which would not be cost effective.*
35.	Continuous monitoring and evaluation of existing and new financial programs should be supported. Actions undertaken to alter financing and reimbursement strategies should not be advanced as permanent mechanisms for change until adequate evaluation/demonstration efforts have been performed.	*Agree.*
36.	Additional research should be accomplished on a broad array of topics related to financial considerations.	*Agree.*

37.	Special project grants for states on a cost sharing basis should be considered to influence the geographic distribution of physicians within the states. The development of incentives for practice in underserved areas is one program to be considered.	*Agree in principle that efforts should be made to influence geographic distribution. Are grants necessary? Recommendation 23 seems to cover this area adequately.*
38.	The development of future medical faculty, administrators, and researchers should be assured by provision of adequate financial support for their training.	*Agree.*
39.	A successor to the Graduate Medical Education National Advisory Committee should be established by statute. This successor should be an advisory body without regulatory functions.	*Agree in principle, only if the successor committee is told to keep its recommendations commensurate with its charge and with the available data. There is also some question about why a statutory committee is needed.*
40.	In addition to the continuous monitoring, the supply projections, requirements estimates, and recommendations of G.M.E.N.A.C. in their entirety must be reevaluated and modified at least every five years to take account of changes in data, assumptions, and priorities occurring over time.	*Agree.*

APPENDIX A

TECHNICAL CRITIQUE OF THE WORK OF THE GMENAC PANELS

It is extremely difficult to validate or verify the results obtained by GMENAC's various specialty panels and the modeling panel for three reasons: (1) differences in report format; (2) differences in use of particular factors; and (3) differences in the composition of the panels.

DIFFERENCES IN REPORT FORMAT

The format of the reports for the various specialties in Volume II varies considerably. One format for a group of surgical specialties displays the same basic formulae and computations for each, together with a table displaying the effects of changes made by the modeling panel, is by far the easiest and most informative for the reader to follow. A second approach is taken by adult medicine and pediatrics, however, where detailed data on the incidence of morbidity are shown along with some measures of physician productivity, but where the computations for sub-specialties and for the broad field are not shown in such a way as to be either clear or verifiable. A third group of specialties--dermatology, emergency medicine, obstetrics/gynecology, preventive medicine, psychiatry, and child psychiatry--makes use of a largely narrative approach with only limited calculations available for analysis. A fourth group is at the opposite extreme: for anesthesiology, neurology, nuclear medicine, pathology, radiology, physical medicine and rehabilitation, projections of supply and need were made and yet no panels were convened.

DIFFERENCES IN USE OF PARTICULAR FACTORS

The various panels varied widely in their use of the 12 factors in the physician requirement model, as noted in the following list of these factors:

1. The incidence and prevalence of morbidity/physical conditions: Throughout much of the report the incidence of morbidity is not clearly identifiable in the computations; the exception is the section on surgical specialties in which formulae for physician requirements include a factor I_c representing the incidence of various conditions. This is no minor matter, since the incidence of morbidity not only is the starting point in GMENAC's analysis, it includes considerably more variables than any of the other factors.

(The report does not indicate the total number of diseases or physical conditions which are listed in the ICDA [International Classification of Diseases, Adapted]. However, some indication of the number of categories of morbidity can be inferred from the section on adult care in which "over 250 morbidity conditions or groups of conditions" were considered by the expert panel.) Scattered throughout this section are numerous examples of the modeling panel making changes--generally reductions--in the incidence of various conditions. For instance, the rate of ICDA #86.0-86.3, arthrotomy and related procedures, was reduced from 150 per 100,000 to 100 per 100,000, thus eliminating the need for 303 orthopedic surgeons

2. The proportion of those with a given illness needing physician care: This factor is difficult to locate in much of the report. However, the formulae for physician need used in the section on surgical specialties seek to determine "service requirements" for physicians. For most of these specialties this factor is included in the formulae, but it is not included in orthopedic and thoracic surgery. The modeling panel has apparently made only two changes in this factor: (1) in urology the proportion of cases of cystitis which should be seen by a physician was reduced from 95 percent to 75 percent; and (2) in otolaryngology the modeling panel reduced the proportion of cases of wax in ear requiring physician attention from 90 percent to 10 percent.

3. The proportion of those cases requiring physician care which need specialist care: This factor is used extensively in the report. It is sometimes combined with the second factor into a percentage that should receive care, with no indication whether it is generalist or specialist care. It is more frequently identified as "share" of the patient load. Instances of the modeling panel making significant changes are fairly common. For contact dermatitis the proportion who should seek care from a specialist was reduced from 40 percent to 20 percent, and for various back problems the percentage to see a neurosurgeon was reduced from 13 to 3. For scrotal varicocele the percentage who should see a urologist was increased from 25 to 60. Perhaps the most significant change was in reducing the share of otitis externa which should be seen by otolaryngologists, thus requiring 689 fewer otolaryngologists in 1990 in a field projected to have a surplus of 500.

4. Office visits required in a year per episode of illness: This factor ought to be apparent in the computations inasmuch as it is important in translating morbidity into a

norm of care. In obstetrics/gynecology the number of visits per pregnancy is clearly identified; in urology and in certain pediatric specialties this factor is also recognizable. But in the formulae and computations of some specialties it appears to have been combined into another factor. It does appear as a formula element, however, in the surgical specialties.

5 Hospital visits required in a year per episode of illness: Other than as a formula element in the surgical specialties, this factor appears clearly only in the pediatric subspecialties.

6. Surgical procedures required in a year per episode of illness: This factor apparently does not even appear in the formula for the surgical specialties where formulae are generally most developed and utilized. Perhaps an assumption has been made that a factor of one should be used for those conditions that commonly call for one surgical procedure per illness.

7. Average time spent in providing each type of service: This factor is not identifiable in this form throughout the report although it does appear as the number of visits per week. The modeling panel reduced the time of deliveries for OB-GYN from 4.5 hours to 3 hours. A similar change was made in orthopedics where the modeling panel increased the office visits per hour from 3.5 to 5.0, an increase that would eliminate the need for 2,449 orthopedic surgeons.

8. Average number of different conditions treated per visit ("simultaneity of care"): This factor is utilized throughout the report with generally little variation occurring between the expert panel and the modeling panel. An exception was in the number of diseases seen by an infectious disease specialist; the modeling panel increased this number from 1.1 per visit to 1.7 per visit, thus reducing the number of specialists needed in 1990 from 1,814 to 1,174, a reduction of 640 in a field with a projected surplus of 1,000.

9. Number of units of a given type of service that could be provided in a year by the typical specialist: The report is replete with this factor, expressed as the number of office visits or hospital visits possible per year for a full-time-equivalent physician doing nothing else. Surgery is treated differently, and is expressed as the total number of working hours of a physician divided by the hours for each surgical procedure. There was some disagreement on this factor,

particularly in the adult care section, with the modeling panel reducing the expert panel's estimate from 6,900 office visits annually to 5,520 in adult primary care, from 2,994 to 1,978 in endocrinology, from 3,871 to 2,747 in infectious disease, and from 3,351 to 2,222 in nephrology.

10. Number of hours worked in an average year by the specialists in question: This factor occurs in all sections of the requirements model. There is considerable difference of opinion between the expert panels and the modeling panel, both on the number of weeks worked per year and the average number of hours per week.

11. Distribution of working time by type of service provided for those specialists: This factor delineates the composition of the physician's workload in each specialty by the percentage of time spent on each condition. Considerable attention is devoted to this factor in most specialties, but there does not appear to be any place in the formulae where this factor operates.

12. Work that could be delegated to nonphysician providers: This factor appears in most specialties, but is generally not apparent in the formulae for the surgical specialties Some disagreement exists; the modeling panel changed the percentage of sick-child visits delegated by pediatric allergists to 27 percent after the expert panel had said 53 percent.*

These variations in the way the expert panels used the various elements of the computer model raise serious questions about the comparability of various sections of the report.

DIFFERENCES IN THE COMPOSITION OF PANELS

A third problem with the way the expert panels approached their tasks was in the varying composition of the panels, which varied from 1 to 12 in their number of members, and from 25 percent to 82 percent in their percentage of members who were from academic medicine. Geographical distribution was also uneven: the allergy panel was midwestern, while infectious disease, pediatrics, and gastroenterology were distinctly eastern in membership Some panels had nurse or allied health members, but in other specialties where non-physician providers are common--pediatrics, ophthalmology, child psychiatry--there were none. Membership on the panels is shown in the following table:

*No other formula factors are listed in the introduction to Volume II in the explanation of methodology, but it is clear that at least one other factor is required by the computer model: the percentage of time spent in non-patient-care activities

Specialty	Academic Medicine	Practice of Medicine	Allied Health/Nursing	Government VA/Military
Adult Medicine	3	3		1
Internal Medicine	3	3		
Allergy	2	1		
Cardiology	1	2		1
Endocrinology	2			
Gastroenterology	3			
Hematology/Oncology	1			1
Infectious Disease	2	1		
Nephrology	2	1		
Pulmonary Disease	2			1
Rheumatology	2			
Pediatrics	4	1		
Pediatric Allergy	1			
Pediatric Cardiology	1			
Pediatric Hematology/ Oncology	1			
Neonatology	1			
Pediatric Endocrinology	1			
Pediatric Nephrology	1			
Dermatology	4	2		
Emergency Medicine	7	3	2	
Neurosurgery	5	3		1
OB/GYN	2	3	2	1
Ophthalmology	9	2		
Orthopedic Surgery	7	7		
Otolaryngology	8	3	1	
Preventive Medicine	3	1	1	4
Psychiatry	4	4	3	1
Child Psychiatry	4	3		
General Surgery	3	4		2
Plastic Surgery	7	3		1
Thoracic Surgery	6	1		2
Urology	8	2		1

One final problem existed in the apparent assumption that the expert panels could err but the modeling panel could not. GMENAC established no procedure for reconciling significant differences of opinion on data. Neither were any attempts apparently made to determine the reliability or validity of data. It would have been prudent for GMENAC to conduct a sensitivity analysis for various factors in the formulae to determine the quantitative impact of these factors on the final result, but this precaution seems not to have been followed.

APPENDIX B

The following pages reproduce pp. 142-153 of Chapter III, "Specialty Specific Requirements Estimates" for Orthopedic Surgery, from Volume II, Modeling, Research, and Data Technical Panel, of the Report of the Graduate Medical Education National Advisory Committee to the Secretary, Department of Health and Human Services.

Other sections of Chapter III contain similar modeling for 16 other specialties besides Orthopedic Surgery, including General Family Practice, Internal Medicine, Child Care, General Surgery, Neurosurgery. Ophthalmology, Otolaryngology, Plastic Surgery, Thoracic Surgery, Urology, Obstetrics/Gynecology, Dermatology, Emergency Medicine, Preventive Medicine, and Psychiatry.

G. ORTHOPEDIC SURGERY

1. Overview

The estimates of the Orthopedic Surgery Delphi Panel led to 1990 requirements for orthopedists which significantly exceed current supply. The principal source of the difference is in the number of office visits to be provided: the panel's estimates of implied office visits per 100,000 population per year was two and one-half times as high as the 1977 figure from the National Ambulatory Medical Care Survey. No single condition or set of conditions, however, can be identified as the cause of the increase. Another, but less important, factor in the difference is the relatively short projected work year of orthopedists: only 44 weeks per year (on average) in patient care in 1990. This is 2 to 3 weeks fewer than most of the other surgical specialties.

The Panel identified microsurgery as an emerging area which would be likely to increase orthopedic service requirements. Microsurgical procedures tend to take a long time and often require two teams of surgeons. Furthermore, improvement in microsurgical training and techniques will permit surgery to be performed in cases where none is now possible, including such procedures as free muscle transfers with vascular and neural connections, free and myocutaneous flap transfers, bone transplants with blood supply, and muscle transplants for correction of congenital or traumatic defects. For a detailed documentation of the Orthopedic Surgery Delphi Panel estimates, see Wills and Garrison, 1980.

2. Documentation of Manpower Requirements Calculation

Manpower requirements in orthopedic surgery were calculated by dividing the total service requirements for visits and surgical care by appropriate productivity estimates, derived from a projected 1990 practice profile of orthopedic surgeons. This quotient is the number of full-time equivalent (FTE) surgeons required to provide patient care in each service category. The sum of FTEs across service categories was then inflated to account for requirements for orthopedic surgeons to perform non-patient care tasks such as teaching, research, and administration.

Each step in the calculation is documented in detail.

Service Requirements--The Orthopedic Surgery Delphi panel estimated service requirements in three categories, as follows:

- Office visits to nonsurgical, nonhospitalized patients;
- Office and inpatient visits to nonsurgical, hospitalized patients; and
- Surgical care, including both the performance of the procedures and the associated inpatient and office visits.

Nonsurgical, Nonhospitalized Patients. Service requirements for nonsurgical, nonhospitalized patients were estimated by the Panel on a condition-by-condition basis. The service requirements were calculated as follows: For each condition, the incidence or prevalence rate (per 100,000 population) for the disease or condition was multiplied by the proportion of individuals with that condition who should be seen by a physician in 1990; this product was then multiplied by the proportion of those individuals who should be seen by an orthopedic surgeon. The proportion who should see a physician are those who should see a physician in a given year. Thus, for example, even if all individuals with a certain chronic condition should at some time or another see a physician, if once diagnosed they need to see a physician only every other year, then the proportion who should see a physician in 1990 is 50 percent.

Then, given the group of patients who should see an orthopedic surgeon in 1990, the Panel established for each condition what proportion of the episodes should be treated entirely within the physician's office; that is, not involving hospitalization or surgery. For these patients with a given condition, a norm of care, measured as the average required office visits per episode per year, was estimated. Then, multiplying this norm by the number of individuals falling into the nonsurgical, nonhospitalized group yields the service requirements for office visits per 100,000 population for this condition.

The total requirements are the sum of these office visits rates across all conditions, multiplied by 2,435, since the 1990 Series II Census Projection for the U.S. population is 243,500,000. A final adjustment was made to account for the fact that the list of conditions considered by the Panel was not exhaustive of all conditions treated by orthopedic surgeons. This was based on the Panel's estimate of the relative size of a residual category which included those other conditions not on the list but yet part of the overall workload. The service requirements for nonsurgical, nonhospitalized patients are summarized in Table III.G.1.

Nonsurgical, Hospitalized Patients--Service requirements for nonsurgical, hospitalized patients were established as follows: For each condition the 1990 nonsurgical hospital admission rate was estimated. Background data on nonsurgical admissions from the Hospital Discharge Survey were used by the Panel in this process.

Once the nonsurgical admission rate had been established, the proportion of these admissions which should be seen by an orthopedic surgeon was estimated. The Panel then estimated the norms of care for these patients. The norms of care specified both the required number of inpatient visits per episode of the condition, and the associated number of office visits required. The product of these factors is the required inpatient visits and office visits per 100,000 population for orthopedic surgeons to treat the nonsurgical, hospitalized patients with a given condition.

Table III.G.1.

SERVICE REQUIREMENTS FOR ORTHOPEDIC SURGEONS
FOR NONSURGICAL, NONHOSPITALIZED PATIENTS

$S_1 = \sum_c (I_c \cdot A_c \cdot B_c \cdot C_c \cdot Nl_c) \cdot 2435/f_1 = 49,996,834$ office visits:

where

S_1 = service requirements;

I_c = morbidity rate (per 100,000) of condition c;

A_c = proportion of episodes of c which should be seen by a physician;

B_c = proportion of episodes seen by a physician which should be seen by an orthopedic surgeon;

C_c = proportion of episodes treated exclusively in the office;

Nl_c = number of annual office visits per episode of c for these patients;

f_1 = proportion of total visit workload represented by the explicitly considered conditions = .93; and

$\sum_c (I_c \cdot A_c \cdot B_c \cdot C_c \cdot Nl_c) = 19,095.3$ visits per 100,000.

Summing the required visits for each condition for this category of patients across all conditions yields the total service requirements. Again, an adjustment was made to account for the fact that the list of conditions considered by the Panel was not exhaustive of every condition orthopedic surgeons treat. The service requirements for nonsurgical, hospitalized patients are summarized in Table III.G.2.

Table III.G.2.

SERVICE REQUIREMENTS FOR ORTHOPEDIC SURGEONS
FOR NONSURGICAL, HOSPITALIZED PATIENTS

A. Inpatient Component

$$S_{2A} = \sum_c (D_c \cdot E_c \cdot N2_c) \cdot 2435/f_1 = 5{,}528{,}759 \text{ inpatient visits:}$$

where

S_{2A} = service requirements;

D_c = nonsurgical admission rate in 1990 for condition c;

E_c = proportion of these patients who should be treated by an orthopedic surgeon;

$N2_c$ = annual inpatient visits per episode of c for these patients; and

$\sum_c (D_c \cdot E_c \cdot N2_c) = 2111.6$ inpatient visits per 100,000.

B. Office Component

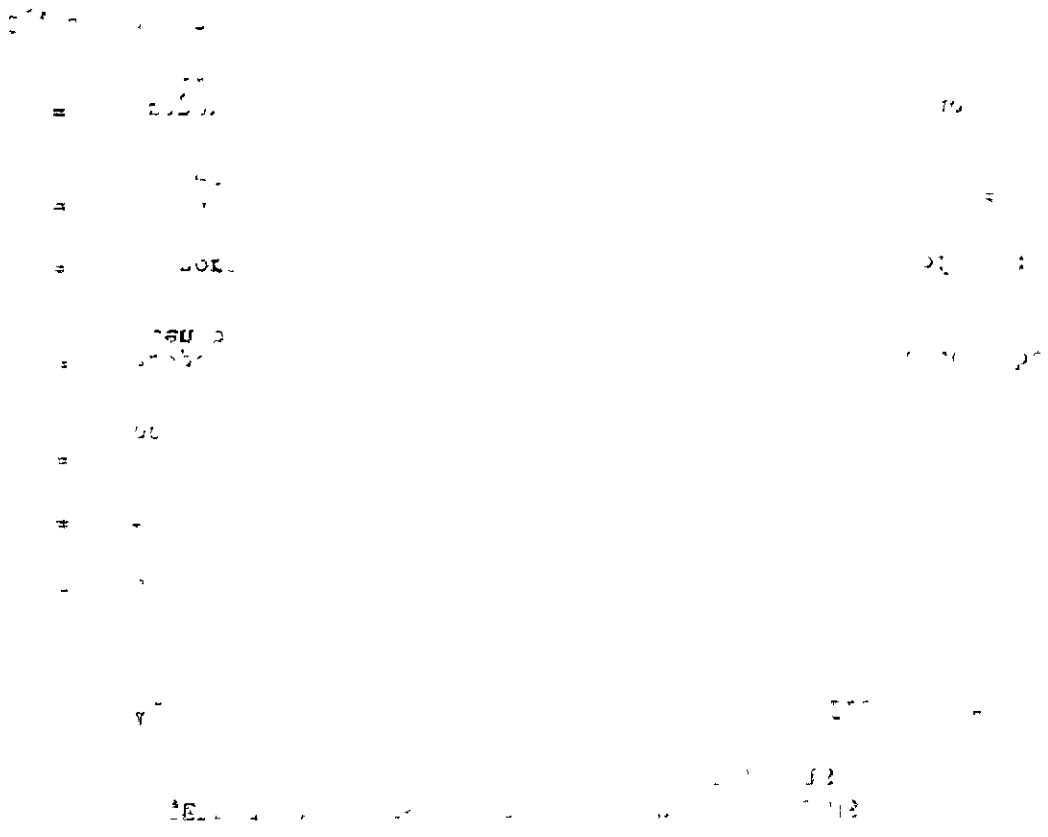
$$S_{2B} = \sum_c (D_c \cdot E_c \cdot N3_c) \cdot 2435/f_1 = 4{,}148{,}141 \text{ office visits:}$$

where

S_{2B} = service requirements;

$N3_C$ = annual office visits per episode of c for these patients; and

$\sum_c (D_c \cdot E_c \cdot N3_c) = 1584.3$ office visits per 100,000.



Surgical Patients--Service requirements for surgical care were estimated on a procedure-by-procedure basis, unlike service requirements for nonsurgical patients, which were estimated on a condition-by-condition basis. For each procedure the Panel estimated the following parameters: the 1990 rate (per 100,000 population) at which the surgical procedure should be performed; the proportion of these which should be done by an orthopedic surgeon; and the average time per procedure.

The time required to perform the procedure included not merely skin-to-skin time in the operating room, but also time for scrubbing, preparation, anesthesia induction, dictating, and writing postoperative orders. The total time requirement for a given procedure per 100,000 population is simply the product of these factors, which was calculated by multiplying the procedure rate by the proportion to be done by orthopedic surgeons, and that by the time required to perform the procedure.

The conditions which accounted for a significant portion of the orthopedic surgery workload are shown in Table III.G.3.

Table III.G.3.

CONDITIONS ACCOUNTING FOR THREE PERCENT OR MORE OF THE 1990 ORTHOPEDIC SURGERY WORKLOAD

ICDA	Condition	Percent of Workload
725, 353, 728, 846, 847	Displacement of intervertebral disc; Sciatica; Vertebrogenic pain syndrome; Sprains and strains of sacroiliac region; Sprains and strains of other unspecified parts of back	3.2%
813	Fracture of radius and ulna	3.0
	TOTAL	6.2%

Because not all procedures are primary procedures, some are secondary to others, a further adjustment was made. For each of several procedures, the Panel estimated the proportion of times it is performed as a secondary rather than the primary procedure. Since giving these cases the time required as a primary procedure would lead to an overestimate of service requirements, the Panel adopted the following convention: For secondary procedures the time required would equal 75 percent of the time specified to perform them as primary procedures. However, no additional visits are to be added when a procedure is performed as a secondary procedure. Whenever a procedure is performed as a secondary procedure a significant portion of the time, this adjustment has been made. This affected a relatively small number of procedures.

In addition to the time required for the performance of the surgical procedure, surgical norms of care included associated inpatient and office visits per episode. For each procedure the Panel estimated the total number of associated inpatient and office visits that would be required for the surgical patient. These were aggregated across all procedures, as were surgery times, in order to estimate the total service requirements. Again, the Panel estimated the relative size of a residual category to account for the fact that not every surgical procedure performed by orthopedic surgeons was explicitly listed on the surgery care list. These calculations are summarized in Table III.G.4.

Table III.G.4.

SERVICE REQUIREMENTS FOR ORTHOPEDIC SURGEONS
FOR SURGICAL CARE

A. Operative Component

$S_{3A} = \sum_p (F_p \cdot G_p \cdot H_p) \cdot 2435/f_2 = 6,877,978$ hours:

where

S_{3A} = service requirements;

F_p = surgery rate (per 100,000) for procedure p;

G_p = proportion of these procedures which should be performed by orthopedic surgeons;

H_p = door-to-door procedure time for procedure p;

f_2 = proportion of surgical workload represented by the explicitly considered procedures = .95; and

$\sum_p (F_p \cdot G_p \cdot H_p) = 2683.4$ hours per 100,000

B. Inpatient Visits Component

$S_{3B} = \sum_p (F_p \cdot G_p \cdot I_p) \cdot 2435/f_2 = 27,736,444$ inpatient visits:

where

S_{3B} = service requirements;
I_p = inpatient visits per episode of p; and
$\sum_p (F_p \cdot G_p \cdot I_p) = 10,821.2$ visits per 100,000

C. Office Visits Component

$S_{3C} = \sum_p (F_p \cdot G_p \cdot J_p) \cdot 2435/f_2 = 25,018,728$ office visits:

where

S_{3C} = service requirements;
J_p = office visits per episode of p; and
$\sum_p (F_p \cdot G_p \cdot J_p) = 9760.9$ visits per 100,000

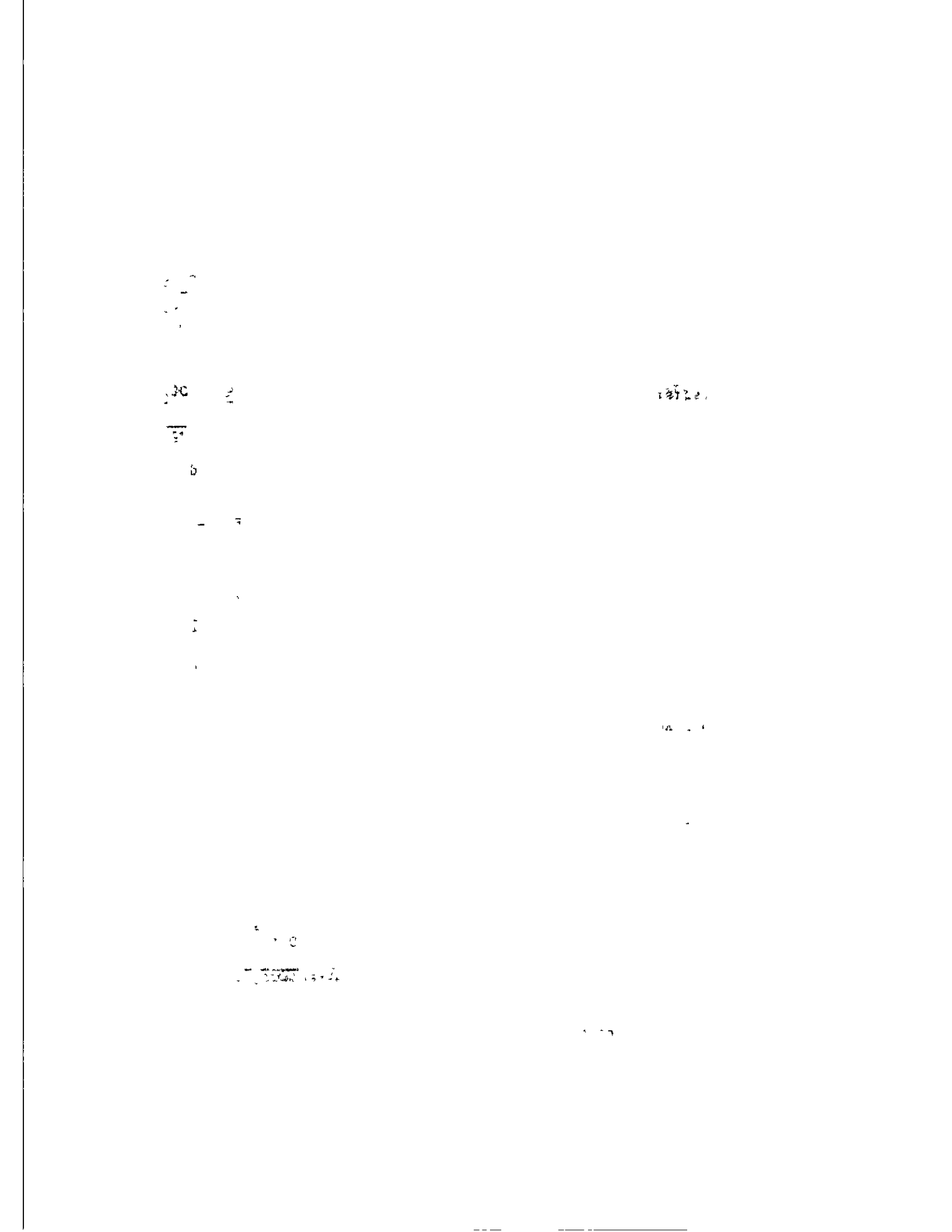
The procedures which accounted for a significant portion of the orthopedic surgery workload are shown in Table III.G.5.

Table III.G.5.

PROCEDURES ACCOUNTING FOR THREE PERCENT OR MORE OF THE 1990 ORTHOPEDIC SURGERY WORKLOAD

ICDA	Procedure	Percent of Workload
82.2*	Reduction (closed or open) of fracture with mention of fixation	11.1
87.3	Repair and plastic operations on other joints	6.8
86.0, 86.1, 86.3	Arthrotomy Division of capsule, cartilage or ligament Excision and destruction of lesion of joint	6.5
82.0*	Reduction (closed or NOS) of fracture without mention of fixation	3.6
86.5	Excision of semilunar cartilage of knee joint	3.4
88.1, 88.2, 88.3, 88.4	Division of muscle, tendon and fascia Excision of lesion of muscle, tendon and fascia Resection of muscle, tendon, fascia and bursa Suture of muscle, tendon and fascia	3.3
80.5	Ostectomy, complete	3.1
	TOTAL	41.4%

*Note HDS redefinition of ICDA Code



The Practice Profile--In order to convert the service requirements into manpower requirements, it is necessary to have an estimate of the expected 1990 productivity of the average orthopedic surgeon. These estimates were derived from Panel estimates of a "typical practice profile," a description of the average annual practice of orthopedic surgeons. Table III.G.6. shows the productivity estimates derived from the profile.

Table III.G.6.

THE ESTIMATED 1990 PRACTICE PROFILE OF ORTHOPEDIC SURGEONS
PRODUCTIVITY ESTIMATES

A. Annual hours worked:

44 (44-46)	Annual weeks worked
x 50 (48-53)	Weekly hours worked
2200	Annual hours worked = P_3

B. Annual full-time equivalent (FTE) office visits productivity:

2200	Annual hours worked
x 3.73*	Office visits per hour (see text)
8207	Office visits per FTE year = P_1

C. Annual FTE inpatient visits productivity:

2200	Annual hours worked
x 3.6 (3.3-7.0)	Inpatient visits per hour
7920	Inpatient visits per FTE year = P_2

D. Percent of time in "other professional time," i.e., not in office or hospital delivering care: 13.8% (10.5-16.0)

By dividing by the appropriate productivity factor, service requirements in each of the three categories discussed above were translated into requirements for full-time equivalent orthopedic surgeons. One final adjustment was necessary to convert the sum of these full-time equivalents into a total required head count: that was, to adjust for orthopedic surgeons who would be required to perform nonpatient care tasks such as teaching, research, and administration. The Panel also estimated this factor and it was used to inflate the full-time equivalents to the required head count of orthopedic surgeons in 1990. Details of the calculations are presented in Table III.G.7. The number of orthopedic surgeons required in 1990 according to the Delphi Panel was 19,688.

Table III.G.7

FINAL REQUIREMENTS FOR ORTHOPEDIC SURGEONS

$$N = \left(\frac{S_1 + S_{2B} + S_{3C}}{P_1} + \frac{S_{2A} + S_{3B}}{P_2} + \frac{S_{3A}}{P_3}\right)/(1-f_3) = 19{,}688:$$

where

N = head count of required orthopedic surgeons; and

f_3 = proportion of all orthopedic surgeons' time in non-patient care activities = .138

3. Modeling Panel Review of Orthopedic Surgery Delphi Panel Estimates

After reviewing the output of the Orthopedic Surgery Panel, the Modeling Panel made a series of recommendations concerning the estimates. These are shown in Table III.G.8.

The net effect of the Modeling Panel's changes was to reduce the estimated requirements for orthopedic surgeons from 19,688 to 14,821. The Committee accepted this estimate. The Committee's recommendation for the number of orthopedic surgeons required in 1990 is 14,700-15,500.

Table III.G.8.

MODELING PANEL RECOMMENDATIONS CONCERNING
ORTHOPEDIC SURGERY PANEL ESTIMATES

Recommendation	Net Change in Number of Orthopedic Surgeons Required
1. Reduce rate of ICDA procedure 03.0, laminectomy (excluding for disc), from 25 to 20, and reduce share from 25 to 10%	-67
2. Reduce rate for 04 group, operations on peripheral nerves, from 147.5 to 100, and increase share from 43% (weighted average) to 75%	+70
3. Increase rate of 82.0, closed reduction, from 140 to 145 (note HDS redefinition of ICDA code) and reduce share from 90 to 80%	-72
4. Increase rate of 82.1, open reduction without fixation, from 30 to 40 (note HDS redefinition of ICDA code) and reduce share from 100 to 95%	+75
5. Reduce rate of 82.2, closed or open reduction with fixation, from 200 to 180 (note HDS redefinition of ICDA code) and reduce share from 100 to 95%	-327
6. Increase rate of 85.7-.8, amputation of leg and thigh, from 24.5 to 25, and reduce share from 75 to 50%	-83
7. Increase rate of 86.4, disc excision, from 79 to 80	+5
8. Reduce share of 87.4, spinal fusion, from 100 to 85%	-76
9. Reduce rate of 89.1-.3, hand operations, from 50 to 40, and reduce share from 77.5 to 75%	-79
10. Reduce share of 805, 806, spinal column fracture, from 100 to 70%	-8

Table III.G.8. (Continued)

Recommendation	Net Change in Number of Orthopedic Surgeons Required
11. Reduce rate of 86.0-.3, arthrotomy, and related procedures from 150 to 100	-301
12. Reduce time required for 86.5, excision of cartilage of knee, from 2 to 1.5 hours	-54
13. Increase office visit rate from 3.73 to 5 per hour	-2449
14. Increase weeks worked per year from 44 to 46	-846

15. Reduce surgery times as follows:

Procedure	Delphi estimate of time required	Modeling Panel estimate	
87.0,.1	2.75	2.5	
87.2	1.625	1.25	
87.3	3.0	2.0	
87.5	2.75	2.5	
87.7	1.5	1.0	
87.4	4.0	3.5	
03.0	3.5	3.0	
86.4	2.5	2.0	
86.0, .1, .3	2.0	1.5	
86.5	2.0	1.5	
82.1*	2.0	1.5	
82.2*	2.875	2.5	
80.0	1.875	1.5	
80.1,..2, .3	2.125	2.0	
80.4	2.5	2.0	
80.6	2.375	2.0	
80.8	1.5	1.0	
85.7, .8	2.5	2.0	
89.1, .2, .3	2.5	2.0	
04.4	3.0	2.5	
Microsurgical procedure	6.0	5.0	
Diagnostic otoscopy	1.5	1.0	-655

*HDS recode of ICDA-8 classification

TOTAL -4867

APPENDIX C

GMENAC ESTIMATES OF PHYSICIAN SUPPLY AND DEMAND

Specialty	Supply 1978	Supply 1990	1990 Need: Delphi/Expert Panel Need	1990 Need: Modelling Panel Need	1990 Need: GMENAC Need
General/Family Practice	54,350	64,400	(a)	84,000	84,000
General Pediatrics	23,800	37,750	38,965	28,712	30,250
Pediatric Allergy	450	900	3,234	924	900
Pediatric Cardiology	600	1,000	1,215	1,092	1,150
Pediatric Endocrinology	N/A	250	899	791	800
Pediatric Hematology/Oncology	N/A	550	1,892	1,617	1,650
Pediatric Nephrology	N/A	200	329	369	350
General Internal Medicine	48,950	73,800	(a)	70,236	70,250
Allergy and Immunology	2,100	3,050	2,327	2,124	2,050
Cardiology	7,700	14,900	7,408	7,371	7,750
Endocrinology	1,400	3,850	3,126	2,129	2,050
Gastroenterology	2,900	6,900	8,700	7,040	6,500
Hematology/Oncology	3,000	8,300	9,312	9,073	9,000
Infectious Disease	850	3,250	3,661	1,936	2,250
Nephrology	1,450	4,850	3,931	2,120	2,750
Pulmonary Disease	2,800	6,950	3,611	3,606	3,600
Rheumatology	1,000	3,000	1,514	1,476	1,700
Dermatology	5,000	7,350	12,762	6,952	6,950
Psychiatry	25,250	30,500	43,000	38,890	38,500
Child Psychiatry	3,050	4,100	10,320	9,000	9,000
Obstetrics/Gynecology	23,100	34,450	26,164	22,701	24,000
General Surgery	30,700	35,300	24,514	23,097	23,500
Neurosurgery	3,000	5,100	2,496	2,793	2,650
Ophthalmology	11,750	16,300	14,688	11,396	11,600
Orthopedic Surgery	12,350	20,100	19,688	14,821	15,100
Otolaryngology	6,100	8,500	9,732	7,779	8,000
Plastic Surgery	2,600	3,900	3,113	2,549	2,700
Thoracic Surgery	2,100	2,900	1,781	1,942	2,050
Urology	7,100	9,350	8,383	7,900	7,700
Emergency Medicine	5,000	9,250	14,686	14,000	13,500
Preventive Medicine (b)	6,100	5,550	7,610	6,010	7,300
Anesthesiology	14,850	19,450	(c)	21,000	21,000
Nuclear Medicine	N/A	N/A	(c)	4,000	4,000
Pathology	12,650	16,850	(c)	14,500	13,500
Physical Medicine/Rehabilitation	2,000	2,400	(c)	3,200	3,200
Radiology	18,550	27,800	(c)	16,250	18,000
Neurology	4,850	8,650	(c)	5,000	5,500
All other and unspecified	14,000	9,700	(c)	-	-
Osteopathic General Practice	13,550	23,850	(a)	(d)	22,700
TOTAL	374,800	535,750			

Notes: (a) Panel not requested to supply data,
(b) Partially modeled,
(c) Specialties not modeled; and
(d) Total for osteopathy is included in 84,000 total for general/family medicine.

Source: McNutt, 1981, p. 1118.

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Volume I	GMENAC Summary Report
Volume II	Modeling, Research, and Data Technical Panel
Volume III	Geographic Distribution Technical Panel
Volume IV	Financing Technical Panel
Volume V	Educational Environment Technical Panel
Volume VI	Nonphysician Health Care Providers Technical Panel
Volume VIII	GMENAC Members' Commentaries and Appendix

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